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ORIGINAL SCIENTIFIC REPORT

# Surgical Training in South Africa: An Overview and Attempt to Assess the Training System from the Perspective of Foreign Trainees

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## Abstract

*Background* Currently, there are no objective reports evaluating the quality of the South African surgical training. The aim of this study is to evaluate the current state of surgical training in South Africa from an external impartial point of view and to rate the experience of short-term supernumerary registrars and fellows (STSRF) within the South African training system.

*Methods* A 29-item survey was distributed via e-mail and social media to non-South African trainees who worked in South Africa as STSRF for a period of at least 1 month during the past 5 years. The survey evaluated the surgical, clinical and academic training received during their elective period in a South African department.

*Results* Sixty-four STSRF replied to the survey. Sixty-two percent of STSRF attended a trauma unit during their experience. For the majority of respondents, open and emergency surgical exposure, as well as experience as first surgeon, is significantly higher in the South African system, while minimally invasive and endoscopic surgery exposure is significantly less. Research project involvement is significantly less, for the STSRF, as opposed to lectures and teaching that constitute a higher percentage. No significant difference was found regarding exposure to hands-on activities.

*Conclusions* The South African system still provides excellent surgical and clinical exposure as well as teaching. However, minimally invasive surgery training and research are generally lacking for the STSRF. Exchange programs between South African and developed country institutes should be improved and encouraged in order to gain mutual benefits.

**Electronic supplementary material** The online version of this article (https://doi.org/10.1007/s00268-019-05034-7) contains supplementary material, which is available to authorized users.

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## Introduction

The importance of high standards of surgical training for junior doctors is fundamental for both trainees and for the country that trains them.

This topic is of increasing interest, not only in developed countries [1–4], but also in developing countries such as South Africa [5, 6]. Guaranteeing an adequate standard of surgical training allows new specialists, with the constant growth of the globalization process, to fill roles as fellows or consultants, both in their own country and abroad.

South African surgical training has historically been considered as top class. Over the past few decades, thousands of supernumerary registrars [7] and fellows from overseas have visited South Africa for training in general, emergency and sub-specialty surgery.

Taking into account the global extent of minimally invasive surgery and the standardization of teaching models, is the current South African setting still achieving a high level of training for general and specialist surgeons? How will short-term experience in South Africa benefit a foreign trainee? Furthermore, could a newly specialized South African cope working as a junior consultant in a foreign non-African country?

The aim of the study is to evaluate the current state of surgical training in South Africa from an external and impartial point of view, drawing from the experience of short-term supernumerary registrars and fellows (STSRF) within the South African training system, and explores how to possibly improve the current structures.

## Methods

A 29-item survey (see Supplementary material) was designed by two European residents (G.M. and P.F.) who have been working as short-term supernumerary registrars in separate South African departments during the academic year 2017–2018.

The survey was designed in accordance with Checklist for Reporting Results of Internet E-Surveys (CHERRIES) [8], uploaded on SurveyMonkey, and it was distributed via e-mail and social media (WhatsApp, Messenger) to other non-South African trainees who worked in South Africa as short-term supernumerary registrars/fellows (STSRF) for at least 1 month during the preceding 5 years. Three questions were on a screen, and ten screens contained the entire questionnaire. The responders were able to review and change the answers until the final submission of the questionnaire. No identifying or sensitive data were collected. Contact details were obtained from university and hospital databases that agreed to support the project; the remainder were reached through word of mouth and social media visibility. The survey was distributed during March and April 2018 to 131 STSRF.

The survey consisted of three parts:

- *Part one* General information of the respondents (nationality, gender, age, registrar versus fellow, discipline of training in their own countries, institution and department of training in South Africa, length of training period in South Africa);
- *Part two* General and specific questions about the surgical (global surgical exposure, open and mini-invasive surgical exposure, procedures performed as first operator), clinical (exposure to outpatient clinic, diagnostic procedures, on-call duties) and academic (training and skill laboratories, lectures, research) training received during their elective period in a South African department. Most of the items were in the form of multiple-choice questions (MCQs), where respondents were requested to select an answer from five possibilities. They were asked to compare the South African training system with their own (much less, less, equal, more, much more) and questioned about their satisfaction during the South African elective period (very dissatisfied, dissatisfied, neither satisfied nor dissatisfied, satisfied, extremely satisfied).
- *Part three* Open answer items about why the STSRF decided to select South Africa for a short training period and what they appreciated the most and the least.

Data were entered into a Microsoft Excel (version 14.0) [Microsoft, Albuquerque New Mexico, USA] database and transferred to SOFAstats™ for Windows (Paton-Simpson & Associates Ltd, 1.4.6/2 January 2016). A statistical correction was not used. A descriptive statistical analysis was performed. Continuous and non-normally distributed variables are presented as mean and/or as a percentage (%). Statistical analysis of nominal variables comparing the South African and other training systems was performed using the Chi-square calculator for goodness of fit. The answers marked as "much less" and "less" were considered as a single variable, as were the answers marked as "much more" and "more." Data were considered significant when $p < 0.05$.

## Results

Sixty-four of the 131 STSRF-invited potential respondents answered the survey (answer rate 48.8%). The complete survey completion rate was 100%, while the completeness rate 81.25%. However, the two skipped questions were most often the open-ended last two that allowed for

personal comment. The demographic features of the sample are summarized in Tables 1, 2, 3 and 4. Most of the STSRF came from Europe (84.4%), and only 1.5% of the STSRF came from a developing country.

The motivations given by the STSRF for choosing an elective period in South Africa were varied: 43.75% were advised by colleagues who previously trained there. Twenty-five percent joined a university exchange program, 20.3% wanted to learn about trauma care, critical care and open surgery, 6.25% were attracted by the worldwide reputation of experts and centers and by the media hype of the world's first penile allotransplantation, Cape Town setting for 4.7% and other reasons for 3.1%.

In Tables 3, 4 and 5, we report the results of the questions comparing South African and country of origin surgical training.

Globally, almost the entire group of STSRF were satisfied or extremely satisfied about the exposure to surgical, clinical and academic activities as well as the overall period in South Africa (Tables 3, 4, 5 and 6). Hands-on experience of open and emergency surgery was what the STSRF appreciated the most (71.9%), followed by the mentorship of extremely professional tutors (7.8%) and improvement in English skills (6.25%). Facilities (18.75%), work load while on call (12.5%), research opportunities (10.9%) and the language barriers (7.8%) were listed as being less enjoyed.

**Table 1** Characteristics of the sample

| Country | N° | Gender | N° |
|---|---|---|---|
| Sweden | 13 (20.5%) | Male | 42 (66%) |
| UK | 10 (15.8%) | Female | 22 (34%) |
| Italy | 9 (14.2%) | Total | 64 (100%) |
| Germany | 8 (12.5%) | Age | N° |
| The Netherlands | 8 (12.5%) | < 25 | None |
| Switzerland | 2 (3.1%) | 25–30 | 26 (40.6%) |
| USA | 2 (3.1%) | 31–35 | 34 (53.1%) |
| Canada | 2 (3.1%) | > 35 | 4 (6.3%) |
| Japan | 2 (3.1%) | Total | 64 (100%) |
| Australia | 2 (3.1%) | Year of residency | N° |
| Yemen | 1 (1.5%) | 1 | None |
| Bahrain | 1 (1.5%) | 2 | None |
| Belgium | 1 (1.5%) | 3 | 13 (20.5%) |
| Austria | 1 (1.5%) | 4 | 22 (34%) |
| Finland | 1 (1.5%) | 5 | 12 (18.8%) |
| Portugal | 1 (1.5%) | 6 | 8 (12.5%) |
| Total | 64 (100%) | Fellows | 9 (14.2%) |

**Table 2** Institution visited and type of training

| Discipline of training in own country | N° |
|---|---|
| General surgery | 25 (39%) |
| Trauma surgery | 15 (23.4%) |
| Urology | 4 (6.2%) |
| Vascular surgery | 5 (7.8%) |
| Pediatric surgery | 6 (9.4%) |
| Orthopedic surgery | 3 (4.8%) |
| Others | 6 (9.4%) |
| Total | 64 (100%) |
| Department of training in South Africa | N° |
| General surgery | None |
| Trauma surgery | 50 (78.1%) |
| Urology | 4 (6.2%) |
| Vascular surgery | 3 (4.8%) |
| Pediatric surgery | 6 (9.4%) |
| Orthopedic surgery | None |
| Others | 1 (1.5%) |
| Total | 64 (100%) |
| Institution visited | N° |
| Stellenbosch University/Tygerberg hospital | 41 (64%) |
| UCT/Groote Schuur/RCCH | 12 (18.7%) |
| University of KwaZulu-Natal | 3 (4.8%) |
| University of the Witwatersrand | 1 (1.5%) |
| Others | 7 (10.6%) |
| Total | 64 (100%) |

*UCT* University of Cape Town, *RCCH* Red Cross Children Hospital

## Discussion

Worldwide training experiences are increasing every year within surgical training programs [9–12]. South Africa has always been a landmark for surgical training, having adopted the evergreen concept of "See one, do one, teach one" [13] that is still shaping generations of doctors.

Data from our study show that most of the STSRF came from developed "First-World" countries, while only 1.5% from developing countries. No STSRF came from South America or Africa.

Despite it being common knowledge that many African trainees come to South Africa to be trained as supernumerary doctors, the vast majority of them complete their entire training course (4–5 years as a registrar and completing the local exit examinations) within South African institutions rather than spending simply a short-term elective time there. In fact, African countries that cannot guarantee a good surgical training on their soil for lack of facilities and mentorship used to send their trainees to South Africa to complete the whole training, since it is one of the nearest affordable counties with good academic and

**Table 3** Surgical training in South Africa

| | Much less | Less | Equal | More | Much more | Total answers |
|---|---|---|---|---|---|---|
| Overall exposure to surgery $p < 0.01$ | 0 (0%) | 0 (0%) | 5 (7.8%) | 30 (46.9%) | 29 (45.3%) | 64 |
| Exposure to MIS $p < 0.01$ | 26 (40.6%) | 30 (46.9%) | 7 (10.9%) | 0 (0%) | 1 (1.6%) | 64 |
| Exposure to open surgery $p < 0.01$ | 0 (0%) | 1 (1.6%) | 1 (1.6%) | 21 (32.8%) | 41 (64%) | 64 |
| Exposure to endoscopy $p < 0.01$ | 15 (23.4%) | 27 (42.2%) | 18 (28.1%) | 3 (4.7%) | 1 (1.6%) | 64 |
| Exposure to trauma $p < 0.01$ | 0 (0%) | 0 (0%) | 0 (0%) | 3 (4.7%) | 61 (95.3%) | 64 |
| Experience as first operator $p < 0.01$ | 1 (1.6%) | 4 (6.2%) | 16 (25%) | 30 (46.9%) | 13 (20.3%) | 64 |
| Global satisfaction of surgical training | 0 (0%) | 1 (1.6%) | 0 (0%) | 10 (15.6%) | 53 (82.8%) | 64 |

**Table 4** Clinical training in South Africa

| | Much less | Less | Equal | More | Much more | Total answers |
|---|---|---|---|---|---|---|
| Autonomy in ward duty $p < 0.01$ | 3 (4.7%) | 9 (14.1%) | 24 (37.5%) | 21 (32.8%) | 7 (10.9%) | 64 |
| Autonomy in OPD $p = 0.013$ | 4 (6.3%) | 6 (9.5%) | 26 (41.3%) | 17 (27%) | 10 (15.9%) | 63 |
| Autonomy in on-call duty $p = 0.002$ | 3 (4.7%) | 10 (15.6%) | 17 (26.6%) | 26 (40.6%) | 8 (12.5%) | 64 |
| Exposure to diagnostic procedures $p = 0.013$ | 4 (6.3%) | 23 (35.9%) | 26 (40.6%) | 9 (14.1%) | 2 (3.1%) | 64 |
| Global satisfaction of clinical training | 0 (0%) | 1 (1.5%) | 3 (4.7%) | 30 (46.9%) | 30 (46.9%) | 64 |

**Table 5** Academic training in South Africa

| | Much less | Less | Equal | More | Much more | Total answers |
|---|---|---|---|---|---|---|
| Access to research $p < 0.01$ | 23 (35.9%) | 36 (56.2%) | 4 (6.3%) | 1 (1.6%) | 0 (0%) | 64 |
| Involvement with research projects $p < 0.01$ | 24 (37.4%) | 34 (53.1%) | 4 (6.3%) | 1 (1.6%) | 1 (1.6%) | 64 |
| Exposure to learning activities $p < 0.01$ | 3 (4.7%) | 9 (14.1%) | 15 (23.4%) | 27 (42.2%) | 10 (15.6%) | 64 |
| Exposure to hands-on $p = 0.056$ | 9 (14.1%) | 17 (26.6%) | 26 (40.5%) | 8 (12.5%) | 4 (6.3%) | 64 |
| Global satisfaction of academic training | 0 (0%) | 4 (6.3%) | 24 (37.5%) | 26 (40.6%) | 10 (15.6%) | 64 |

**Table 6** Comprehensive global satisfaction of the visiting period

| | Extremely dissatisfied | Dissatisfied | Neither satisfied nor dissatisfied | Satisfied | Extremely satisfied | Total answers |
|---|---|---|---|---|---|---|
| Comprehensive global satisfaction | 0 (0%) | 1 (1.6%) | 1 (1.6%) | 11 (17.2%) | 51 (79.6%) | 64 |

surgical training programs [7]. On the other hand, developing countries with an adequate training system might not allow an elective period abroad to their trainees, in order not to lose precious workers in surgical wards and theaters.

Postgraduate training in South Africa comprises 2 years of internship, followed by 1 year of community service before to access to a (surgical) residency program. There are accredited programs only at the 8 Faculties of Medicine at South African Universities. While internship and community service are often carried out in a primary or secondary hospital, registrars are mostly trained in the tertiary hospital linked to the related university. Rotation periods in other hospitals are also possible in order to achieve a satisfying and required skills and logbook, but these are supervised by the same eight medical schools.

Furthermore, an elective period itself requires a significant amount of funds, which are often self-financed by the STSRF and that developing countries registrars often cannot afford.

The majority of STSRF, even those specializing in other surgical fields, come to be trained in a trauma unit. South Africa is sadly famous for its crime, trauma centers and

therefore trauma surgeons. The rainbow nation possesses some of world's biggest trauma units, where hundreds of patients are managed everyday by registrars of numerous surgical and other disciplines [6]. On the contrary in developed countries, residents are rarely involved as first operator in managing adult emergencies or pediatric cases, with a huge lack of experience in such important fields [14–18].

This aspect, while attractive in itself may also lead to some degree of stress on the less-supervised trainees in the South African scenario [19, 20]. Legendary hospitals [21], the fame of expert surgeons and the media hype of the recent world's first penile allotransplantation [22] contributed to attracting elective short-term supernumerary surgeons. Virtually, the entire group of STSRF rate their surgical experience in South Africa as excellent for advancing their skills and improving their CVs.

South African training is structured in order to guarantee skilled professionals able to work effectively in heterogeneous and sometimes difficult environments as well as resource-poor settings.

While, in the developed world, there is no controversy regarding transfer to sub-speciality training from as early as residency [23], this national overview gives the impression that South African junior specialists are experienced, skilled and well-rounded professionals, however, simultaneously with poor sub-specialization in minimally invasive surgery as well as in the research field.

In the era of the sub-specialities and "publish or die," the lack of exposure to research can represent an obstacle in pursuing an international or academic career [24, 25], even if foreign colleagues are often not more learned or better trained. This may, however, be a perception of the foreign trainees, given that all local registrars are expected to undertake a MMed degree research project as part of their training, whereas the STSRF may not be present for long enough to undertake research [26].

It is difficult to say whether South African registrars might work independently in a first-world country after obtaining his degree. The quality of the South African training on basic procedures seems to be superior, but the lack of experience in laparoscopic and robotic procedures seems to be limiting. The exponential increase in the request for minimally invasive surgery in first-world countries [27] by patients would suggest that a targeted fellowship in minimally invasive procedures may be advisable in order to fill this gap.

STSRF might act as a resource, ensuring an international network, extra funds for academic departments and additional hands in the hospitals, particularly as the South African public system suffers an extensive shortage of doctors. Every department should plan for a basic training and supervision program, in order to make up for the lack of experience in managing specific types of diseases and exposure to a different cultural environment, ensuring that both STSRF and patients receive the best work experience and patient care. Due to the limited number of STSRF trained in a department other than in the trauma unit (i.e., 4 in urology, 6 in pediatric surgery, etc.), no statistical analysis was performed on this subgroup. However, in most of the questions the statistical findings are so similar that it can be assumed that the same findings are probable in each subgroup.

Exchange affiliation programs with universities in developed countries should be improved, giving more chances for South African registrars to do short elective fellowships in minimally invasive surgery and research during or after their residency [19, 20].

This study has some biases. First of all, more than 50% of the responders were from a single center (University of Stellenbosch/Tygerberg Hospital), even if it may be one of the biggest African universities and with STSRF taking advantage of this setting.

Secondly, the size of the sample is small, albeit in our opinion, it is adequate enough if it compared to the global limited number of South African registrars [5–7] and, even more, of STSRF.

STSRF are a steady component in many South African surgical departments, coming with the main goal to get trained in the management of trauma and surgical emergencies as well as to have more overall exposure as first surgical operator.

## Conclusion

The South African system still appears to be first class in terms of surgical and clinical exposure, accompanied by good teaching, and remains popular for the short-term training of international trainees in the category STSRF. However, a paucity of minimally access surgery training and research exposure is offered to the STSRF, probably since they desire clinical training. To enhance the system and improve the experience further, STSRF-formalized exchange programs between South African and other international institutions in developed countries should be implemented and encouraged in order to gain mutual benefit and the medical council should fast-track a cost-efficient and accessible registration system for prospective trainees.

### Compliance with ethical standards

**Conflicts of interest** The authors declare that they have no conflict of interest.

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